

WHAT IS CLAIMED IS:

1 1. A reduced pressure backflow preventer comprising:
2 a body defining a passageway for flow of fluid between a supply pipe and a service
3 pipe;
4 a first check valve assembly positioned in the passageway;
5 a relief valve assembly positioned downstream of the first check valve assembly; and
6 a reservoir coupled to the body and configured to release fluid in a manner to delay
7 flow from operation of the relief valve assembly.

1 2. The reduced pressure backflow preventer of claim 1, wherein the body further
2 defines a first conduit in fluid communication with the passageway downstream of the check
3 valve and a second conduit in fluid communication with the passageway downstream of the
4 check valve;

5 the reduced pressure backflow preventer further comprising a first valve is positioned
6 in the first conduit; and

7 the relief valve assembly further comprises a first diaphragm positioned in the first
8 conduit and a second valve positioned in the second conduit, the first diaphragm being
9 configured to actuate the first valve and the second valve.

1 3. The reduced pressure backflow preventer of claim 2, wherein the first diaphragm is
2 disposed in sealing engagement with an inside wall of the body to define a chamber, and said
3 reduced pressure backflow preventer further comprises a tube providing fluid communication
4 between the passageway upstream of the check valve and the chamber.

1 4. The reduced pressure backflow preventer of claim 1, wherein the reservoir
2 comprises a wall member disposed within the reservoir and defining a first reservoir portion
3 fluidly isolated from a second reservoir portion.

1 5. The reduced pressure backflow preventer of claim 4, wherein the wall member
2 comprises a flexible diaphragm.

1 6. The reduced pressure backflow preventer of claim 4, wherein the reservoir further
2 comprises a spring in biasing contact with the wall member.

1 7. The reduced pressure backflow preventer of claim 6, wherein the wall member
2 comprises a first wall member and a second wall member, the first wall member and the
3 second wall member being attached by a rod.

1 8. The reduced pressure backflow preventer of claim 4, wherein the reservoir further
2 comprises a first port in fluid communication between the first reservoir portion and the
3 passageway upstream of the check valve and a second port in fluid communication between
4 the second reservoir portion and the passageway downstream of the check valve.

1 9. A relief valve assembly comprising:
2 a body defining a first conduit;
3 a first valve positioned in the first conduit;
4 a first diaphragm in sealing engagement with an inside wall of the body to define a
5 chamber fluidly isolated from the first conduit, the first diaphragm being configured to
6 actuate the first valve; and
7 a reservoir in fluid communication with the chamber.

1 10. The relief valve assembly of claim 9, wherein the body further defines a second
2 conduit, and said relief valve assembly further comprises a second valve in the second
3 conduit; and
4 the first diaphragm being configured to actuate the second valve.

1 11. The relief valve assembly of claim 10, further comprising a connecting rod
2 coupling the first valve and the second valve.

1 12. The relief valve assembly of claim 9, wherein the reservoir further comprises a
2 wall member disposed within the reservoir and defining a first reservoir portion fluidly
3 isolated from a second reservoir portion.

1 13. The backflow prevention assembly of claim 12, wherein the wall member
2 comprises a flexible diaphragm.

1 14. The relief valve assembly of claim 12, wherein the reservoir further comprises a
2 spring in biasing contact with the wall member.

1 15. The relief valve assembly of claim 12, wherein the wall member comprises a first
2 wall member and a second wall member, the first wall member and the second wall member
3 being interconnected in an H-shape cross-sectional configuration.

1 16. The relief valve assembly of claim 12, wherein the reservoir further comprises a
2 first port in fluid communication between the first reservoir portion and the chamber.

1 17. A method of stabilizing the operation of a relief valve in a backflow prevention
2 assembly comprising the steps of:

3 storing a fluid in a reservoir in fluid communication with a relief valve assembly; and,
4 upon a loss of pressure in a supply pipe, releasing stored fluid into a first conduit of
5 the relief valve assembly.

1 18. The method of claim 17 comprising the further step of:

2 sensing loss of fluid pressure in the supply pipe.

1 19. The method of claim 18 wherein the step of sensing the loss of fluid pressure
2 comprises sensing a pressure change at a diaphragm.

1 20. A reduced pressure backflow preventer comprising:

2 a body defining a flow passageway in communication between a supply pipe and a
3 service pipe;

4 a first check valve and a second check valve disposed in said flow passageway and
5 defining a flow chamber therebetween;

6 a relief valve assembly disposed in communication with said flow chamber, said
7 relief valve assembly being responsive to pressure differential across said first check valve in
8 a backflow situation to open to allow fluid to drain from said flow chamber to external of
9 said body,

10 said relief valve assembly comprising a diaphragm having a first surface
11 exposed to a region in communication with said flow chamber at a service side of said first
12 check valve and an opposite second surface exposed to a region in communication with said
13 flow chamber at a supply side of said first check valve,

14 said diaphragm being responsive to a pressure differential between said first
15 surface and said second surface to move between a first position, during normal flow,
16 resisting flow of fluid through said relief valve assembly and a second position, during
17 backflow, allowing flow fluid through said relief valve assembly; and

18 a stabilizer device comprising a fluid reservoir in communication with a volume at
19 said second surface of said diaphragm and a flow constrictor orifice for resisting flow of fluid
20 from said volume at said second surface of said diaphragm, for temporarily maintaining
21 pressure at said second surface, thereby to temporarily delay movement of the diaphragm
22 toward said second position during backflow.

1 21. A reduced pressure backflow preventer comprising

a body defining a flow passageway in communication between a supply pipe and a service pipe;

a first check valve and a second check valve disposed in said flow passageway and defining a flow chamber therebetween;

a relief valve assembly disposed in communication with said flow chamber, said relief valve assembly being responsive to pressure differential across said first check valve in a backflow situation to open to allow fluid to drain from said flow chamber to external of said body,

said relief valve assembly comprising a diaphragm having a first surface exposed to a region in communication with said flow chamber at a service side of said first check valve and an opposite second side exposed to a region in communication with said flow chamber at a supply side of said first check valve,

said diaphragm being responsive to a pressure differential between said first surface and said second surface to move between a first position, during normal flow, resisting flow of fluid through said relief valve assembly and a second position, during backflow, allowing flow fluid through said relief valve assembly; and

a relief valve charging device in communication between a first region at a supply side of said first check valve and a second region at a service side of said first check valve, said charging device comprising a chamber containing an element moveable in response to pressure differential across said first check valve and a spring biasing said element in a first direction, for increasing the effective volume of said second region in response to reduced pressure in said first region.

22. A reduced pressure backflow preventer comprising:

a body defining a passageway for flow of fluid between a supply pipe and a service pipe;

means for regulating flow in the passageway;

means for relieving pressure in the passageway; and

means for delaying flow from operation of the means for relieving pressure.